

CLAIMS

What is claimed is:

1. A method for determining whether to enforce a plurality of filter rules for a packet including a key in a computer network, each of the plurality of filter rules having a priority, the method comprising the steps of:

(a) accumulating statistics for each of the plurality of filter rules, the statistics indicating a frequency of enforcement for each of the plurality of filter rules; and

(b) placing the plurality of filter rules in an order for testing against the key, the order being based on the frequency of each filter rule of the plurality of filter rules.

2. The method of claim 1 wherein the order is from a higher priority filter rule of the plurality of filter rules to a lower priority filter rule of the plurality of filter rules.

3. The method of claim 1 wherein the ordering step (b) further includes the step of:

(b1) providing a decision tree for testing the plurality of filter rules, the decision tree being configured based on the frequency of each of the plurality of filter rules and so that the plurality of filter rules can be tested in the order, a first portion of the plurality of filter rules having at least one higher priority being placed higher in the tree.

4. The method of claim 3 wherein the decision tree providing step (b1) further includes the steps of:

3 (b1i) rebuilding the decision tree after the expiration of an interval of time.

1 5. The method of claim 4 wherein the interval of time is determined based on a
2 determination of how frequently a second portion of the plurality of filter rules is enforced.

1 6. The method of claim 5 wherein the interval of time decreases when the first
2 portion of the plurality of filter rules are accessed less frequently than a third portion of the
3 plurality of filter rules.

1 7. The method of claim 4 when the interval of time is determined based on a
2 previous interval of time.

1 8. The method of claim 4 wherein the computer network further includes a
2 network processor and wherein the rebuilding step (b1i) further includes the step of:

3 (b1i-a) placing the plurality of filter rules in the decision tree based on the priority of
4 each of the plurality of filter rules and at least one performance factor of the network
5 processor.

1 9. A system for determining whether to enforce a plurality of filter rules for a
2 packet including a key in a computer network, each of the plurality of filter rules having a
3 priority, the system comprising:

4 at least one network processor for accumulating statistics for each of the plurality of
5 filter rules, the statistics indicating a frequency of enforcement for each of the plurality of

6 filter rules and testing a portion of the plurality of filter rules against the key in an order, the
7 order being based on the frequency of each filter rule of the portion of the plurality of filter
8 rules; and

9 at least one memory for storing the plurality of filter rules.

1 10. The system of claim 9 wherein the order is from a higher priority filter rule of
2 the portion of the plurality of filter rules to a lower priority filter rule of the portion of the
3 plurality of filter rules.

1 11. The system of claim 9 further comprising:
2 a decision tree for testing the plurality of filter rules, the decision tree being
3 configured based on the frequency of each of the plurality of filter rules and so that the
4 network processor tests portion of the plurality of filter rules in the order, a first portion of
5 the plurality of filter rules having at least one higher priority being placed higher in the tree.

1 12. The system of claim 11 wherein the decision tree is rebuilt after the
2 expiration of an interval of time.

1 13. The system of claim 12 wherein the interval of time is determined based on a
2 determination of how frequently a second portion of the plurality of filter rules is enforced.

1 14. The system of claim 13 wherein the interval of time decreases when the first
2 portion of the plurality of filter rules are accessed less frequently than a third portion of the

3 plurality of filter rules.

1 15. The system of claim 12 when the interval of time is determined based on a
2 previous interval of time.

1 16. The system of claim 12 wherein the plurality of filter rules is placed in the
2 decision tree based on the priority of each of the plurality of filter rules and at least one
3 performance factor of the network processor.

1 17. The system of claim 9 wherein the at least one memory includes a fast
2 memory and wherein a first portion of the plurality of filter rules are placed in the fast
3 memory, each of the first portion of the plurality of filter rules having a higher priority.

1 18. A switch for use in a computer network, the switch determining whether to
2 enforce a plurality of filter rules for a packet including a key, each of the plurality of filter
3 rules having a priority, the switch comprising:

4 at least one network processor for accumulating statistics for each of the plurality of
5 filter rules, the statistics indicating a frequency of enforcement for each of the plurality of
6 filter rules and testing a portion of the plurality of filter rules against the key in an order, the
7 order being based on the frequency of each filter rule of the portion of the plurality of filter
8 rules;

9 at least one memory for storing the plurality of filter rules; and

10 a switch fabric coupling the plurality of processors.
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1 19. A computer-readable medium including a program for determining whether
2 to enforce a plurality of filter rules for a packet including a key in a computer network, each
3 of the plurality of filter rules having a priority, the program including instructions for:

4 (a) accumulating statistics for each of the plurality of filter rules, the statistics
5 indicating a frequency of enforcement for each of the plurality of filter rules; and

6 (b) placing the plurality of filter rules in an order for testing against the key, the
7 order being based on the frequency of each filter rule of the plurality of filter rules.

1 20. The computer-readable medium of claim 19 wherein the order is from a
2 higher priority filter rule of the plurality of filter rules to a lower priority filter rule of the
3 plurality of filter rules.

1 21. The computer-readable medium of claim 19 wherein placing instructions (b)
2 further includes instructions for:

3 (b1) providing a decision tree for testing the plurality of filter rules, the decision
4 tree being configured based on the frequency of each of the plurality of filter rules and so
5 that the plurality of filter rules can be tested in the order, a first portion of the plurality of
6 filter rules having at least one higher priority being placed higher in the tree.

1 22. The computer-readable medium of claim 21 wherein the decision tree
2 providing instructions (b1) further includes instructions for:

3 (b1i) rebuilding the decision tree after the expiration of an interval of time.

1 23. The computer-readable medium of claim 22 wherein the interval of time is
2 determined based on a determination of how frequently a second portion of the plurality of
3 filter rules is enforced.

1 24. The computer-readable medium of claim 23 wherein the interval of time
2 decreases when the first portion of the plurality of filter rules are accessed less frequently
3 than a third portion of the plurality of filter rules.

1 25. The computer-readable medium of claim 22 when the interval of time is
2 determined based on a previous interval of time.

1 26. The computer-readable medium of claim 22 wherein the computer network
2 further includes a network processor and wherein the rebuilding instructions (b1i) further
3 includes instructions for:

4 (b1i-1) placing the plurality of filter rules in the decision tree based on the priority of
5 each of the plurality of filter rules and at least one performance factor of the network
6 processor.

1 27. A method for determining whether to enforce a plurality of filter rules for a
2 packet including a key in a computer network, each of the plurality of filter rules having a
3 priority, the method comprising the steps of:

4 (a) accumulating statistics for each of the plurality of filter rules, the statistics
5 indicating a frequency of enforcement for each of the plurality of filter rules; and

6 (b) testing a portion of the plurality of filter rules against the key in an order, the
7 order being based on the frequency of each filter rule of the portion of the plurality of filter
8 rules.

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